TABLE D.—*Monthly and annual departures of average cloudiness from the normal*, 1901.

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
New England	+0.6	−1.1	+1.1	+2.1	+1.1	−0.9	+1.1	+0.6	−0.5	−0.9	+1.0	+0.6	+0.4
Middle Atlantic	+0.3	−1.1	+0.4	+1.4	+1.2	−0.4	+0.7	+0.6	−0.1	−1.0	+0.3	+0.5	+0.2
South Atlantic	−0.3	−1.0	−0.2	+0.3	+0 8	+0.2	0.0	+0.3	−0.1	−1.1	−1.2	+0.4	−0.2
Florida Peninsula	−0.5	−0.5	−0.4	−0.6	−0.5	+0.5	+0.6	+0.6	+0.4	+0.1	−1.2	+0.3	−0.1
East Gulf	−0.7	0.0	−0.4	0.0	−0.1	−0.4	0.0	+0.5	+0.1	−1.2	−0.9	+0.6	−0.2
West Gulf	0.0	+0.4	−1.5	−0.6	−0.3	−1.1	+0.2	−0.6	−0.1	−0.5	−0.2	−1.1	−0.4
Ohio Valley and Tennessee	−0.2	−0.4	+0.3	+0.7	+0.2	−0.8	−1.1	+0.6	−0.4	−1.4	−1.0	+0.6	−0.2
Lower Lakes	+0.7	+0.5	+0.9	+0.5	+1.0	0.0	−0.3	+0.9	−0.2	−0.9	+0.2	−0.1	+0.3
Upper Lakes	+0.5	−0.5	+1.3	−0.5	+0.6	0.0	+0.3	+0.1	+0.5	−0.5	+0.6	+0.5	+0.2
North Dakota	−0.4	−1.1	−0.5	+0.1	−2.2	+0.5	−0.6	−0.2	+1.6	−1.0	−1.0	+1.1	−0.3
Upper Mississippi Valley	−0.3	−1.0	+1.0	−0.4	−0.5	−0.7	−1.1	−0.6	+0.2	−0.5	−1.3	+0.8	−0.4
Missouri Valley	−0.9	−0.8	+0.1	−0.3	−1.2	−0.6	−1.6	−0.8	+0.5	+0.3	−0.8	+0.6	−0.5
Northern Slope	0.0	+0.1	−0.1	−0.2	−0.6	+0.5	−1.2	−0.7	+1.2	−0.8	0.0	+1.0	−0.1
Middle Slope	0.0	+0.8	+0.1	+0.8	−0.2	−0.3	−0.6	0.0	+0.8	+0.7	+0.4	+0.6	+0.3
Southern Slope	+1.1	+0.6	−0.6	0.0	+0.1	−1.6	+0.2	−1.1	+0.8	+1.4	+0.9	−0.8	+0.1
Southern Plateau	+0.6	+0.8	−0.6	+0.4	+0.4	−0.4	−0.4	−0.5	−1.0	+0.8	+0.7	−1.0	0.0
Middle Plateau	+0.2	+2.0	−0.1	+0.3	+0.6	+0.2	+0.1	+1.4	−0.9	+0.9	+1.0	−0.8	+0.4
Northern Plateau	−0.3	−0.3	−0.7	−0.9	+0.1	+0.4	−1.1	+0.1	+1.0	−1.2	+0.6	−0.5	−0.2
North Pacific	+0.4	−0.7	+0.5	−0.4	+0.7	+0.4	+0.5	−0.6	+0.1	+0.2	+1.3	+0.3	+0.2
Middle Pacific	+0.5	+1.4	−1 3	−0.9	+0.2	−0.6	−0.4	+1.3	+0.8	+1.0	+2.2	−2.1	+0.2
South Pacific	+0.9	+0.5	−1 6	−0.6	+0.6	−0.3	−0.6	+0.2	0.0	+0.2	+0.9	−1.7	−0.1

SPECIAL CONTRIBUTIONS.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during December*, 1901.

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1901.	Normal, 1889–1900.	Observed, 1901.	Normal, 1889–1900.	Observed, 1901.	Normal, 1889–1900.	Observed, 1901.	Normal, 1889–1900.	Duration, 1901.
	660+ *Mm.*	660+ *Mm.*	°*C.*	°*C.*	%	%	*Mm.*	*Mm.*	*Hrs.*
1 a. m.	3.60	3.64	16.40	16.46	85	87	0.0	0.5	0.00
2 a. m.	3.21	3.22	16.13	16.33	86	87	0.0	1.9	0.00
3 a. m.	2.98	2.96	15.74	16.23	88	87	0.0	0.4	0.00
4 a. m.	3.05	3.02	15.42	16.06	88	87	0.0	0.5	0.00
5 a. m.	3.24	3.28	15.42	16.00	87	87	0.0	1.5	0.00
6 a. m.	3.50	3.63	15.42	16.01	87	87	0.0	1.3	0.00
7 a. m.	3.86	4.10	16.66	17.01	81	83	0.0	1.1	0.00
8 a. m.	4.18	4.47	18.72	18.61	72	78	0.0	0.9	0.00
9 a. m.	4.35	4.67	20.76	20.48	68	73	0.0	0.6	0.00
10 a. m.	4.42	4.62	22.38	21.84	65	69	0.0	0.5	0.00
11 a. m.	4.08	4.32	23.35	22.58	64	67	1.3	1.8	0.66
12 m.	3.57	3.76	23.93	23.08	64	67	2.5	2.0	1.17
1 p. m.	2.97	3.17	23.76	23.24	64	67	1.0	2.1	0.83
2 p. m.	2.59	2.77	23.69	23.24	65	68	2.6	2.7	2.60
3 p. m.	2.37	2.42	22.80	23.24	67	69	3.4	2.4	1.25
4 p. m.	2.36	2.52	21.26	21.09	73	74	1.2	5.5	0.58
5 p. m.	2.60	2.75	19.72	19.73	75	77	3.0	3.0	1.42
6 p. m.	2.92	3.16	18.90	18.64	80	81	5.5	2.0	2.42
7 p. m.	3.39	3.67	18.52	18.04	82	83	0.1	2.3	0.75
8 p. m.	3.84	3.97	18.14	17.69	83	84	0.3	1.1	1.00
9 p. m.	4.21	4.42	17.77	17.41	84	85	0.0	1.3	0.00
10 p. m.	4.34	4.48	17.36	17.07	85	86	0.0	1.2	0.00
11 p. m.	4.25	4.31	16.93	16.85	85	86	2.0	1.8	0.92
Midnight	4.06	4.01	16.52	16.62	86	87	2.3	0.8	0.92
Mean	3.50	3.54	18.98	18.63	78	80	.....	.....	.....
Minimum	660.4	659.23	11.9	9.2	.....	.....	.....	.....	.....
Maximum	668.3	667.82	29.3	29.2	.....	.....	2.3	.....	.....
Total	.....	.....	.....	.....	.....	.....	25.2	39.0	13.92

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. In the Costa Rican system the San Jose local time is used, which is 0h 36m 13.3s slower than seventy-fifth meridian time.

TABLE 2.

Time.	Sunshine.		Temperature of the soil at depth of—					Cloudiness observed, 1901.
	Observed, 1901.	Normal, 1889–1900.	0.15 *m.*	0.30 *m.*	0.60 *m.*	1.20 *m.*	3.00 *m.*	
	Hours.	*Hours.*	°*C.*	°*C.*	°*C.*	°*C.*	°*C.*	%
7 a. m.	6.88	4.89	19.12	19.33	19.98	20.51	21.00	36
8 a. m.	22.75	17.86	.....	.....	.....	.....	.....	.....
9 a. m.	24.00	18.54	.....	.....	.....	.....	.....	.....
10 a. m.	18.91	17.43	19.85	19.41	20.01	20.53	.....	51
11 a. m.	17.68	15.40	.....	.....	.....	.....	.....	.....
12 m.	17.16	13.98	.....	.....	.....	.....	.....	.....
1 p. m.	14.98	14.17	19.74	19.55	20.03	20.50	.....	62
2 p. m.	16.76	14.95	.....	.....	.....	.....	.....	.....
3 p. m.	16.61	14.82	.....	.....	.....	.....	.....	.....
4 p. m.	14.40	14.08	19.84	19.58	20.03	20.44	.....	67
5 p. m.	7.99	9.85	.....	.....	.....	.....	.....	.....
6 p. m.	1.41	1.77	.....	.....	.....	.....	.....	.....
7 p. m.	.....	.....	19.76	19.59	20.03	20.42	.....	56
8 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m.	.....	.....	19.63	19.57	20.00	20.40	.....	41
11 p. m.	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	19.60	19.51	20.00	20.46	21.00	55
Total	179.48	157.74	.....	.....	.....	.....	.....	.....

TABLE 3.—*Rainfall at stations in Costa Rica, December*, 1901.

Stations.	Amount.	No. rainy days.	Stations.	Amount.	No. rainy days.
	Mm.			*Mm.*	
1. Sipurio (Talamanca)	310	16	14. Juan Vinas	109	9
2. Boca Banano	366	24	15. Santiago	174	14
3. Limon	284	15	16. Paraiso	43	9
4. Swamp Mouth	.....	.....	17. Las Concavas	38	13
5. Zent	391	14	18. Cartago	68	14
6. Gute Hoffnung	.....	.....	19. Tres Rios	57	9
7. Siquirres	396	10	20. S. Francisco G	27	9
8. Guapiles	417	18	21. San Jose	25	11
9. Sarapiqui	689	24	22. La Verbena	145	5
10. San Carlos	175	18	23. Nuestro Amo	.....	.....
11. Las Lomas	490	16	24. Alajuela	.....	.....
12. Turrialba	.....	.....	25. San Isidro Alajuela	52	5
13. Peralta	304	18			

Notes on the weather.—On the Pacific slope, fine weather, without any excess of temperature or humidity, prevailed up to the 28th, after which there came a succession of stormy and relatively icy days. On the 31st, 10 a. m., the highest

pressure since 1888 was recorded at San José (668.3 mm.) and the same day was also the coldest in fourteen years of observations, the mean temperature of the twenty-four hours being 14.23° C. On the Atlantic slope rainy days prevailed all through the month, with several storms, the exact dates of which could not be obtained.

Earthquakes.—December 27, 10h a. m., tremors. December 30, 10h 10m p. m., slight tremors.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. Maxwell Hall, the following data are offered to the MONTHLY WEATHER REVIEW in advance of the publication of the regular monthly weather report for Jamaica:

Comparative table of rainfall for December, 1901.
(Based upon the average stations only)

Divisions.	Relative area.	Number of stations.	Rainfall.	
			Average.	1901.
			Inches.	*Inches.*
Northeastern division	25	21	9.45	8.38
Northern and subcentral division	22	54	5.60	6.17
Western-central division	26	24	3.91	4.30
Southern division	27	32	2.66	2.62
General means	100	131	5.40	5.37

In taking the average rainfall Mr. Hall uses only those stations for which he has several years of observation, so that the column of averages represents fairly well the normal rainfall for each division, while the column for the current month represents the average rainfall at those same stations. The relative areas of the divisions are very nearly the same and are given in the preceding table as expressed in percentages of the total area of Jamaica. The number of rainfall stations utilized in each area varies slightly from month to month, according as returns have come in promptly or not, but will not differ greatly from the numbers in the second column of the table.

Jamaica, W. I., climatological data, December, 1901.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 22′	76° 10′
Elevation (feet)	33	8
Mean barometer 7 a. m.	29.936	29.925
Mean barometer 3 p. m.	29.878	29.880
Mean temperature 7 a. m	75.0	78.6
Mean temperature 3 p. m	82.1	83.1
Mean of maxima	85.3	.....
Mean of minima	72.7	.....
Highest maximum	89.0	.....
Lowest minimum	68.0	.....
Mean dew-point 7 a. m	69.9	.....
Mean dew-point 3 p. m	71.5	.....
Mean relative humidity 7 a. m.	84.0	.....
Mean relative humidity 3 p. m.	71.0	.....
Total rainfall (inches)	0.78	7.88
Average wind direction 7 a. m	ne.	nne.
Average wind direction 3 p. m	nne.	nne.
Average hourly velocity, miles 7 a. m	8.8	12.2
Average hourly velocity, miles 3 p. m	12.3	14.2
Average cloudiness (tenths):		
7 a. m. Lower clouds	2.1	1.6
7 a. m. Middle clouds	1.7	1.8
7 a. m. Upper clouds	1.7	1.0
3 p. m. Lower clouds	0.6	2.1
3 p. m. Middle clouds	5.0	2.0
3 p. m. Upper clouds	1.7	0.9

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens.

REPORT OF THE CHIEF OF THE WEATHER BUREAU FOR THE YEAR ENDING JUNE 30, 1901.[1]

Dated July 22, 1901.

OCEAN FORECASTS AND INTERNATIONAL COOPERATION.

An important extension of the forecast work of the Bureau was made during the year. By an arrangement with the secretary of the meteorological office at London, England, the transmission by cable from London to Washington of meteorological reports from certain points in the British Isles and on the Continent of Europe, and from Ponta Delgada, Azores, was begun December 18, 1900. These reports, with observations from Nassau, Bermuda, and Turks Island, have been regularly published on the daily weather maps issued at Washington, Baltimore, Philadelphia, New York, and Boston, together with forecasts of the force and direction of the wind and the state of the weather for the first three days out of steamers bound east from American ports.

The Atlantic forecasts, which are based on the American, Atlantic, and European telegraphic reports, were begun January 7, 1901, and on June 1, 1901, they were made a part of the regular general night forecasts issued at Washington. In a number of instances, when storms of marked strength were passing eastward off the American coast, forecasts were issued of the character of the weather which would probably be experienced by steamers leaving European ports westward bound, and by an arrangement with Lloyd's, of London, these advices have been cabled to England.

In addition to the daily forecasts of wind and weather and special storm warnings, predictions of fog were issued when conditions favorable for fog development had been indicated in the steamer tracks west of the fiftieth meridian. Reports from transatlantic steamships show that these forecasts and special warnings have been well verified.

In November, 1900, arrangements were made with Portugal to receive reports from the meteorological observatory at Horta, in the Azores. Observations are now regularly received by cable from that place, and they are of much value in the work of forecasting the movements of storms on the Atlantic Ocean.

NEW FORECAST DISTRICTS.

Three additional forecasting districts have been established and designated as the New England district, the West Gulf district, and the Rocky Mountain district, with headquarters at Boston, New Orleans, and Denver, respectively. The last appropriation bill passed by Congress made provision for three additional forecast officials to be placed in charge of these districts with authority to issue forecasts and warnings for the several States that are comprised in each district. This system has the advantage of enabling each forecaster to devote more time to the consideration of the predictions for each district and of securing an earlier distribution of forecasts. As these forecast officials were selected on account of their

[1] We reprint herewith the Annual Report of the Chief of the Weather Bureau to the Secretary of Agriculture, omitting only the sections devoted to the Galveston Hurricane, and Frost and Flood warnings, which are made up largely of matter that has already appeared in the REVIEW. This report contains much that is of interest to our many voluntary observers, and which they will probably not see elsewhere.